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JOHN R. MOHLER, Chief

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UNIT REQUIREMENTS FOR PRODUCING MARKET MILK IN SOUTHEASTERN LOUISIANA.[1]

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CONTENTS.

	Page.		Page.
Character and scope of the work	1	Factors involved in the production of milk—Continued.	
Methods of obtaining data	2	Pasture	8
Requirements for producing 100 pounds of milk	3	Labor	8
Description of the herds	4	Other costs	9
Requirements for keeping a cow one year	4	Percentage comparison of factors involved	10
Credits for manure and calves	4	Average costs compared with bulk-line costs	11
Requirements for keeping a bull	7	Monthly distribution of factors in milk production	13
Factors involved in the production of milk	7	Summary	14
Feeds	7		

CHARACTER AND SCOPE OF THE WORK.

How many pounds of grain, hay, and silage and how many hours of labor does it take to produce 100 pounds of milk in the different dairy sections of the United States? How much does it cost for buildings, equipment, and the general expenses of the dairy? The answers to these questions should be of interest and value to dairymen throughout the country. In 1915 the Bureau of Animal Industry, United States Department of Agriculture, began a series of studies on groups of dairy farms in different sections of the United States to obtain accurate information along these lines. The first step taken was to develop a system whereby the actual cost of producing milk could be obtained month by month on practical dairy farms in market milk centers of the United States.

Investigations have been completed and the results published for northwestern Indiana (Department Bulletin 858), North Carolina,[2]

[1] The data in this bulletin apply especially to milk shipped from this section to the New Orleans market.

[2] A bulletin on this investigation was published by the North Carolina Department of Agriculture.

western Washington (Department Bulletin 919), and Vermont (Department Bulletin 923). This bulletin deals with the conditions in the vicinity of New Orleans, La. The work was organized among a group of 17 dairymen living in Tangipahoa Parish, La., in March, 1918. The specialist of the department made monthly visits to each farm for two years, until April, 1920. This locality was selected because the farms are typical of conditions found in that section and the milk is shipped to a large city market, New Orleans.

Although the figures obtained show what was required to produce market milk under the system of dairy management found in the section studied, and probably approximate the requirements in similar sections, they, of course, do not apply to dairying in other sections, where other conditions and methods of management prevail. The dairies were subject to the inspection system controlling the sanitary conditions under which milk could be shipped and sold in the New Orleans market. The cost of production would have been somewhat different if either higher or lower grades of milk had been produced.

The results have been reported separately for the winter and summer seasons because the season of the year may have a marked influence on the principal factors of cost. Summer conditions prevail from April to September, inclusive, and winter conditions from October to March, inclusive. This division of time was used in reporting the results for the winter and summer seasons.

The various tables are based upon figures obtained during the two-year study and the weighted averages of these records were used whenever they would express the results more accurately. The weighted average was obtained by giving each item a different weight in the average according to its relative importance.

METHODS OF OBTAINING DATA.

The figures reported are based on actual records obtained by regular monthly full-day visits to 14 farms for two years and to 8 other farms for one year.

At the beginning and the end of each year the field agent took an inventory of the dairy buildings, livestock, and equipment used in the care of the herd and its products. On his regular monthly visit at each farm the agent, with watch in hand, noted and recorded the exact minute each labor operation in the dairy was begun and ended. An equally careful record was obtained of the kind, description, quantity, and cost of each feed used, the quantity of milk sold that month, and the amount received for it. In addition, the milk used by the proprietor and his help or fed to calves was measured or weighed on the monthly visit and used as a basis for determining the quantity kept on the farm during the month.

The dairyman kept itemized accounts of expenses incurred between monthly visits and reported these items to the field agent. Monthly records were also kept of the purchase or sale of cows, calves, hides, of outside bull service, and of other miscellaneous information. Accurate records of calves born and first-hand information on the condition and methods of handling manure were collected systematically.

The collection of monthly records lessened the influence of unusual circumstances at the time of any particular visit. The use of the records of all the herds for each month made it possible to obtain representative data for each month, season, and year. Records were obtained the second year as a check on the first year's work and to increase the quantity of data for study.

REQUIREMENTS FOR PRODUCING 100 POUNDS OF MILK.

To obtain more uniform results and to overcome the effect of fluctuating prices, money values have been eliminated wherever possible. Feed requirements in pounds and the labor requirements in hours make it possible to apply current prices.

TABLE 1.—*Units required, except charge for management, for producing 100 pounds of milk in winter and in summer.*

Item.	Winter.		Summary of two winters.	Summer.		Summary of two summers.
	1918–19.	1919–20.		1918.	1919.	
Feed:						
Purchased concentrates.....pounds..	69.9	71.7	70.8	49.8	54.5	52.2
Home-grown grains.....do....	.9	2.4	1.6	.2	.3	.3
Total concentrates.....do....	70.8	74.1	72.4	50.0	54.8	52.5
Hauling and grinding grain.....	$0.072	$0.117	$0.095	$0.036	$0.062	$0.050
Noncommercial roughage....pounds..	8.6	19.3	14.1	.2	1.6	.9
Commercial carbohydrate hay..do....	6.5	23.5	15.2	.....	1.0	.5
Commercial legume hay.....do....	8.5	9.5	9.0	.....	1.0	.5
Total dry roughage.....do....	23.6	52.3	38.3	.2	3.6	1.9
Silage and other succulent roughage, pounds.....	80.8	76.0	78.4	12.4	4.0	8.1
Pasture.....	$0.197	$0.115	$0.155	$0.228	$0.169	$0.197
Bedding.....pounds..	.6	.....	.3	.....	.....	.....
Labor:						
Human.....hours..	6.3	5.3	5.8	5.2	4.7	5.0
Horse.....do....	.9	.8	.9	.6	.7	.7
Other costs:						
Building charges.....	$0.318	$0.194	$0.255	$0.215	$0.130	$0.171
Equipment charges and dairy supplies.	.343	.344	.344	.231	.230	.230
Herd charges—						
Taxes, insurance, veterinary, medicines, and disinfectants.....	.069	.094	.082	.047	.063	.055
Interest on cow investment.....	.208	.242	.225	.140	.162	.151
Cost of keeping bull.....	.087	.078	.082	.030	.043	.037
Motor-truck charge.....	.001	.016	.009	.001	.005	.003
Cash hauling of milk.....	.....	.....	.....	.....	.012	.006
Total of other costs except depreciation on cows.....	1.026	.968	.997	.664	.645	.653
Depreciation on cows.....	.271	.177	.223	.183	.119	.150
Total of other costs.....	1.297	1.145	1.220	.847	.764	.803

Table 1 shows that a large quantity of grain and small quantities of dry roughage and silage were fed for each 100 pounds of milk produced in winter. A large quantity of grain was fed in summer also. The amount of grain per cow per year was not excessive, but the small quantity of milk produced tended to increase the grain per 100 pounds of milk. The quantity of grain, however, could have been materially reduced had more roughage been fed.

DESCRIPTION OF THE HERDS.

During the first year the 17 herds had a total of 452 cows with an average yearly production of 2,994 pounds of milk, testing 4.6 per cent butterfat. The second year's study included 440.6 cows with an average yearly production of 3,263 pounds of milk having an average butterfat test of 4.2 per cent.

A large proportion of the cows were so-called "native" stock. Many of the herds, however, had cows showing some Jersey characteristics, and the milk production of most of the herds is being increased by the use of purebred bulls of the dairy breeds. The eradication of the cattle tick from this section has also increased the yearly milk production of the cows.

REQUIREMENTS FOR KEEPING A COW ONE YEAR.

The quantity of milk produced, as shown in Table 2, was slightly greater in summer than in winter, but the quantity of grain fed per cow was practically the same for both seasons.

The beneficial effect of pasture is shown in Table 2 in the comparative quantities of dry roughage and silage fed in the winter and summer seasons. It is the custom to allow some of the herds to range over the "Piney-Woods" pasture, which furnishes fair grazing.

Owing to the mild, open winters, the quantity of bedding used is so small as to be negligible.

CREDITS FOR MANURE AND CALVES.

The method followed for obtaining the value of manure takes into consideration the fertilizing constituents of the feeds fed, as obtained from standard tables showing the fertilizing constituents returned in the individual feeds consumed.

About three-fourths of the protein in the feeds fed to dairy cows passes through the body and is voided in the manure. This protein is a source of nitrogen which is valuable as fertilizer. The same is also true of phosphoric acid and potash. Practically every dairy farm has use for all manure voided by the herd. The commercial value of the manure depends upon the use to which it is put. The returns in dollars depend upon the increase in the crops raised and in the amount received from the sale of these crops. These facts may

reduce or increase the value of a ton of manure below or above the market price of the fertilizing constituents contained in it.

TABLE 2.—*Number of cows, average production, and requirements for keeping a cow during each season and for the entire year, except charge for management.*

Item.	Winter.	Summer.	Entire year.
Number of cows	855.9	929.4	892.6
Average production per cow.....pounds..	1,309	1,797	3,106
Feed:			
Purchased concentrates.....do....	927	939	1,866
Home-grown grains.....do....	22	5	27
Total concentrates.....do....	949	944	1,893
Hauling and grinding grain	$1.25	$0.89	$2.14
Noncommercial roughage.....pounds..	185	17	202
Commercial carbohydrate hay.....do....	200	9	209
Commercial legume hay.....do....	118	9	127
Total dry roughage.....do....	503	35	538
Silage and other succulent roughage.....do....	1,026	145	1,171
Bedding.....do....	4	.....	4
Pasture	$2.03	$3.55	$5.58
Labor:			
Human.....hours..	75.3	89.2	164.5
Horse.....do....	11.6	12.1	23.7
Other costs:			
Building charges	$3.33	$3.07	$6.40
Equipment charges and dairy supplies	4.50	4.14	8.64
Herd charges—			
Taxes, insurance, veterinary, medicines, and disinfectants	1.07	.99	2.06
Interest on cow investment	2.95	2.72	5.67
Cost of keeping bull	1.08	.66	1.74
Motor-truck charge	.12	.05	.17
Cash hauling of milk	.....	.11	.11
Total of other costs except depreciation on cows	13.05	11.74	24.79
Depreciation on cows	2.92	2.69	5.61
Total of other costs	15.97	14.43	30.40

The value of a ton of manure, which was considered to be the same for summer and winter, was based on the market price of the fertilizing constituents contained in it, which were as follows: Nitrogen, $0.375 a pound; commercial phosphoric acid, $0.075 a pound; and potash, $0.275 a pound.

Only that manure which was saved or which could have been saved by using reasonable care with the equipment available was credited to the cows. It was not possible to weigh the quantity of manure dropped by each herd, but a record was kept of the time the cows were actually in the stables. This made it possible to figure the weight of the manure voided in the barns, for, according to the best authorities, a 1,000-pound cow will produce 13 tons of manure in a year, or 6½ tons in 6 months. The manure dropped on pasture was not credited to the herds. If a credit had been given, then an offset charge for fertilizer against pasture would have been necessary.

Since a cow during digestion utilizes on the average only approximately 25 per cent of the nitrogen, 30 per cent of the phosphorus,

and 15 per cent of the potash, it is evident that 75 per cent of the nitrogen, 70 per cent of the phosphorus, and 85 per cent of the potash is available for fertilizers.

TABLE 3.—*Credits for manure and fertilizing constituents during the two winters and the two summers.*

Item.	Winter.			Summer.		
	1918–19	1919–20	Average.	1918	1919	Average.
Total manure saved.....tons..	355.2	360.2	357.7	329.8	314.6	322.2
Manure per cow.....pounds..	1,620	1,740	1,680	1,420	1,340	1,380
Manure credited per 100 pounds of milk, pounds.....	130.4	125.1	127.7	81.6	74.8	78.2
	Winter average.			Summer average.		
	Nitrogen.	Phosphoric acid.	Potash.	Nitrogen.	Phosphoric acid.	Potash.
Fertilizing constituents in manure, pounds.....	3,148	1,180	1,860	2,822	1,073	1,678
Credit per cow.....pounds..	7.4	2.8	4.3	6.1	2.3	3.6

When obtaining the quantity of manure saved, a number of factors were taken into consideration—the time the cattle were out of the stables, making the manure unreclaimable; the quantity of liquid lost through leaks in the gutters; and the loss from leaching while exposed to the weather.

According to the method used for determining it, a ton of average manure saved was computed to contain the following fertilizing constituents:

Nitrogen.....8.8 pounds.
Commercial phosphoric acid.....2.3 pounds.
Potash.....5.2 pounds.

The demand for newborn calves was very limited and many calves were given away, nothing being received in return. This accounts for the low credit of $1.60 per cow for the first year and $3.01 for the second year.

TABLE 4.—*Credits by years and by seasons for calves produced.*

Item.	Year.		Credit by seasons.	
	1918–19	1919–20	Both winters.	Both summers.
Number of calves	404	351	367	388
Total value of calves	$724.75	$1,325.59	$985.00	$1,065.34
Average value of calves	$1.79	$3.78	$2.68	$2.75
Calves per cow	0.89	0.80	0.43	0.42
Credit per cow	$1.60	$3.01	$1.15	$1.15
Credit per 100 pounds of milk	0.030 of 1 calf.	0.024 of 1 calf.	0.033 of 1 calf.	0.023 of 1 calf.

REQUIREMENTS FOR KEEPING A BULL.

There is a noticeable difference between winter and summer in the feed and pasture requirements for a bull. The quantity of bedding is so small as to be negligible, and is due to the fact that only a few bulls received any bedding at all and then only for short periods in the winter.

Many of the bulls retained in the herds increased in value during the year and some bulls sold for beef during the year brought more than their inventory value at the beginning of the year. These conditions were brought about mainly by the unusual conditions incident to the war period.

TABLE 5.—*Requirements for keeping a bull, by seasons, based on averages obtained from the equivalent of 24.3 bulls.*

Item.	Winter.	Summer.	Entire year.
Feed:			
Purchased concentrates.....pounds..	667	459	1,126
Home-grown grain.....do....	54	22	76
Total concentrates.....do....	721	481	1,202
Hauling grain.....	$0.58	$0.49	$1.07
Noncommercial roughage.....pounds..	206	.....	206
Commercial carbohydrate hay.....do....	170	136	306
Commercial legume hay.....do....	230	37	267
Total dry roughage.....do....	606	173	779
Succulent roughage.....do....	972	154	1,126
Bedding.....do....	4	.....	4
Pasture.....	$1.18	$3.48	$4.66
Human labor.....hours..	17.4	16.2	33.6
Other costs:			
Interest on bull investment.....	$8.21	$7.53	$15.74
Bull's share of buildings.....	3.94	3.61	7.55
Charges for outside bull service.....	.....	.11	.11
Total of other costs.....	12.15	11.25	23.40
Appreciation.....	10.89	10.00	20.89
Total of other costs less appreciation.....	1.26	1.25	2.51

FACTORS INVOLVED IN THE PRODUCTION OF MILK.

FEEDS.

Concentrates is a term applied to grain, cereals, or seeds, or to by-products containing a large quantity of nutritious substance in a relatively small bulk.

Home-grown grains refer to concentrates grown on the farm or in the locality where fed.

Dry roughage includes various hays and other bulky feeds which are subdivided into three classes: (1) Noncommercial dry roughage, coarse feeds, such as corn stover and oat hay, which ordinarily could not be sold in large quantities on the city markets, and hay or other dry roughage so foul with weeds or so damaged in curing as not to be readily salable; (2) commercial leguminous roughage, which

includes alfalfa, cowpea, lespedeza, and other marketable legume hays when pure, or when so slightly mixed with grasses as not materially to affect the protein content; and (3) commercial carbohydrate hay, which refers to all marketable hays except those classified as commercial leguminous roughage.

Succulent roughage consists of silage and such feeds as sweet potatoes and soiling crops.

The quantities of the various feeds used were obtained from actual weights made by the field agent on his regular monthly visit to each farm. Purchased concentrates were charged at the price paid and home-grown grains at the market price less cost of marketing. The various salable roughages were charged at the market price on the farm, and noncommercial roughages at a price commensurate with their value as compared with marketable roughage.

PASTURE.

On some of the farms, the pastures had been seeded and fenced, and received considerable care. On other farms the herds were allowed to graze over the "Piney-Woods" pasture, which consisted of cut-over timber lands. This land produced some grass and considerable underbrush. Practically the only charge for the "Piney-Woods" pasture was the extra time for a man and horse to hunt the cows and drive them home. The pasture did not cost much and its value as a source of feed was low.

LABOR.

The average labor rate per hour was obtained by dividing the wages per month plus such extra consideration as board, house rent, milk, and fuel by the total number of hours available for work.

The hours available for work during the month were determined by the field man on his monthly visit to each farm. He noted the time work began in the morning and when it ceased in the evening, subtracting the time for meals and rest. The hours per day thus obtained were multiplied by the number of working days in that month, to which was added the work necessary on Sundays.

No charge for management was made, owing to the fact that no satisfactory basis could be found upon which to make such charge. The manager was allowed wages, for the time he worked as a regular hand, at the same rate per hour as it would have been necessary to pay if he had hired a man of equal skill to do the work. It should be remembered, therefore, that in any place where costs are shown the charge for skill of management has been omitted.

Table 6 shows that 75 per cent of the work in winter and 70.9 per cent of the work in summer was performed by men. The remainder of the work was performed by women or by boys and girls.

TABLE 6.—*Per cent of labor performed and hours per 100 pounds of milk for each class of help.*

Class of labor.	Winter.				Summer.			
	Distribution of work performed.			Labor for 100 pounds of milk.	Distribution of work performed.			Labor for 100 pounds of milk.
	1918–19	1919–20	Average.	Average.	1918	1919	Average.	Average.
	Per cent.	*Per cent.*	*Per cent.*	*Hours.*	*Per cent.*	*Per cent.*	*Per cent.*	*Hours.*
Managers	29.1	37.1	33.1	1.89	21.1	35.3	28.2	1.40
Hired men	37.4	46.3	41.9	2.39	41.3	44.1	42.7	2.12
Total man labor	66.5	83.4	75.0	4.28	62.4	79.4	70.9	3.52
Women	19.2	13.3	16.2	.94	17.3	18.7	18.0	.89
Boys and girls	14.3	3.3	8.8	.52	20.3	1.9	11.1	.55
Total	100.0	100.0	100.0	5.74	100.0	100.0	100.0	4.96

OTHER COSTS.

Other costs include such charges on buildings, equipment, and cattle as interest, depreciation, taxes, and repairs.

TABLE 7.—*Percentage relationship between buildings, equipment, and cattle costs and the capital invested.*

Item.	Buildings.	Equipment.	Cattle.	Total.
Capital invested	$27,924.52	$12,107.90	$63,658.00	$103,690.42
Capital invested per cow	31.28	13.57	71.31	116.16
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Interest	8.4	8.8	8.0	.....
Depreciation	6.3	30.4	8.1	.....
Taxes	.7	.....	1.0	.....
Insurance	.1	.....	.....	.....
Upkeep and repairs	6.0	10.5	.....	.....
Milking-machine repairs	.....	.4	.....	.....
Total	21.5	50.1	17.1	22.1

Table 7 represents the average relationship as it was found in the dairies studied. It does not necessarily represent the standard nor the most economical relationship between the factors.

The figures at the foot of each of the four columns show the percentage relationship of the cost to the capital invested as recorded at the heads of the columns.

BUILDINGS.

At the beginning of the work the buildings and silos were inventoried at their replacement value in normal times. After the first inventory, the subsequent values were determined by deducting from the value at the beginning of the year the amount of depreciation during the year. The depreciation per year was based upon the remaining years of usefulness of the buildings. Insurance charges were taken from the receipts of the insurance companies.

The cost for upkeep and repairs was obtained by keeping a record of actual expenditures made during the year. Necessary expenses, such as roofing and painting, which do not occur every year, were determined by prorating the costs over the length of life of the roof or the duration of the paint and charging only the yearly share of such expense.

EQUIPMENT.

Because of rapid wear and breakage farm tools and equipment have a short life, which explains the depreciation charge of 30.4 per cent. The cost of such supplies as washing powder, coal oil, and gasoline amounted to $1.99 per cow per year.

CATTLE.

Milk produced by a purebred cow has no greater value than that produced by a grade cow. Raising purebred cattle is a separate business involving larger investment and operating costs and resulting in larger credits for calves dropped. To avoid the effect of the purebred business upon the requirements for producing milk, the purebred cows found in the herds, which consisted mainly of grade cows, were given values equal to those of grade cows of corresponding production. Purebred calves were likewise credited as grade calves from grade cows of corresponding production.

At the beginning and end of the year each cow was given an inventory value. The first value was based on the price for which the owner thought he could replace her. In order to avoid the influence of market conditions her subsequent value remained the same unless her owner thought that she had become a better or a poorer cow. However, it was impossible in many cases to prevent the market condition from influencing the judgment of the owner.

To obtain the depreciation on cattle, the value of every cow that entered the herds during the year was added to the inventory at the beginning of the year; from this result was subtracted the total value of the cows at the end of the year plus the price received for cows sold during the year.

Taxes chargeable to the dairy were taken from the official tax records.

PERCENTAGE COMPARISON OF FACTORS INVOLVED.

A comparison of the cost of producing milk in winter and in summer, and the items chiefly responsible for this variation are presented in Table 8.

The totals of the cost of production in the first two columns show that it cost 4.6 per cent more to produce milk in winter than it did in summer. The feed, bedding, and pasture cost was 5.2 per cent

more in winter but the labor cost was slightly less in winter than in summer.

The credit for calves and manure amounted to 7.2 per cent of the total annual gross cost. On the farms studied the credits for calves and manure failed by 15.2 per cent of the gross cost (18.2+4.2−7.2) to equal the "other costs," including depreciation on the herds.

TABLE 8.—*Per cent of total annual gross costs represented by feed, labor, and other costs and credits for calves and manure, by seasons.*

Item.	Winter.	Summer.	Entire year.
	Per cent.	*Per cent.*	*Per cent.*
Feed and bedding cost	27.9	21.4	49.3
Pasture cost	1.4	2.7	4.1
Feed, bedding, and pasture cost	29.3	24.1	53.4
Labor cost	11.7	12.5	24.2
Other costs except herd inventory variation	9.2	9.0	18.2
Total cost except herd inventory variation	50.2	45.6	95.8
Depreciation on herd	2.1	2.1	4.2
Total cost of production	52.3	47.7	100.0
Credits for calves and manure:			
Calves	0.8	0.9	1.7
Manure	2.9	2.6	5.5
	3.7	3.5	7.2

AVERAGE COSTS COMPARED WITH BULK-LINE COSTS.

Table 9 shows the difference between the average and the bulk-line costs. Considerable latitude is allowable in selecting the bulk line, but it is usually selected to include from 80 to 90 per cent of the total volume of milk produced. Thus the bulk-line cost indicates the cost at or below which the greater volume of the milk is produced. Only the dairymen having extremely high costs will have costs above the bulk-line cost. This table shows the figures for each separate herd, and the relative position of the average cost and the average income in the scale of herd costs.

During the first winter 84 per cent of the milk was produced at a cost of $5.67 or less per 100 pounds. The average cost of producing milk for this same period was $4.97 and the average income received from milk was $4.34 for each 100 pounds sold.

During the first summer the bulk-line cost might be placed at either $3.37 or $3.44, since the table shows that 86 per cent of the total volume of milk was produced at or below $3.37 and 90.4 per cent at or below $3.44. The average income from milk sold during this season was $3.37 per 100 pounds.

The bulk-line cost for the second winter might be placed at $6.59 or $6.74, since these costs correspond to 81.4 per cent and 87.2 per cent, respectively, of the total volume.

TABLE 9.—*Net cost, quantity, and per cent of milk produced by each herd, during two winters and two summers.*

Winter 1918–19.				Winter 1919–20.			
Cost per 100 pounds.	Milk produced.			Cost per 100 pounds.	Milk produced.		
	Quantity.	Per cent of total.	Cumulative per cent.		Quantity.	Per cent of total.	Cumulative per cent.
	Pounds.	*Per cent.*	*Per cent.*		*Pounds.*	*Per cent.*	*Per cent.*
$3.65	25,469	4.7	4.7	$3.22	48,270	8.4	8.4
3.94	41,231	7.6	12.3	3.74	31,911	5.5	13.9
4.28	32,805	16.0	18.3	4.62	26,030	4.5	18.4
4.31	55,007	10.1	28.4	4.75	27,879	4.8	23.2
[1] 4.34				[1] 4.94			
4.53	28,114	5.1	33.5	4.98	29,695	5.2	28.4
4.62	21,027	3.9	37.4	5.29	20,366	3.5	31.9
4.63	42,384	7.8	45.2	5.39	32,758	5.7	37.6
[2] 4.97				5.43	31,970	5.5	43.1
4.98	45,478	8.3	53.5	5.46	41,967	7.3	50.4
4.99	25,188	4.6	58.1	5.57	23,593	4.1	54.5
5.02	55,427	10.2	68.3	[2] 5.57			
5.34	40,610	7.5	75.8	5.87	21,289	3.7	58.2
5.47	20,624	3.8	79.6	6.14	13,563	2.4	60.6
5.67	23,754	4.4	84.0	6.20	26,277	4.6	65.2
6.26	53,063	9.7	93.7	6.49	43,810	7.6	72.8
6.30	7,647	1.4	95.1	6.59	49,597	8.6	81.4
6.55	26,950	4.9	100.0	6.74	33,134	5.8	87.2
				6.77	23,893	4.1	91.3
				6.90	36,338	6.3	97.6
				6.96	13,608	2.4	100.0
	544,778	100.0			575,948	100.0	

Summer 1918.				Summer 1919.			
$2.07	35,700	4.4	4.4	$2.02	60,814	7.0	7.0
2.08	86,067	10.7	15.1	2.06	58,227	6.8	13.8
2.42	78,539	9.7	24.8	2.39	42,348	4.9	18.7
2.45	40,436	5.0	29.8	2.93	47,959	5.6	24.3
2.62	45,251	5.6	35.4	3.08	29,126	3.4	27.7
2.82	31,840	3.9	39.3	3.13	36,180	4.2	31.9
2.88	40,251	5.0	44.3	3.25	63,617	7.4	39.3
[2] 2.91				3.38	32,357	3.8	43.1
3.02	36,369	4.5	48.8	3.49	79,340	9.2	52.3
3.03	52,455	6.5	55.3	[2] 3.51			
3.04	37,039	4.6	59.9	3.62	43,543	5.0	57.3
3.13	76,424	9.5	69.3	3.80	58,674	6.8	64.1
3.36	70,210	8.7	78.0	3.82	45,902	5.3	69.4
3.37	64,837	8.0	86.0	3.99	61,723	7.2	76.6
3.44	35,066	4.3	90.4	[1] 4.14			
3.47	30,209	3.7	94.1	4.32	36,643	4.2	80.8
3.65	32,043	4.0	98.1	4.56	19,376	2.2	83.0
[1] 3.87				4.60	65,992	7.7	90.7
4.47	15,563	1.9	100.0	4.91	16,106	1.9	92.6
				4.93	32,188	3.7	96.3
				4.98	31,838	3.7	100.0
	808,299	100.0			861,953	100.0	

[1] Average income. [2] Average cost.

The high price of feed made the cost of production much higher than it would have been under normal conditions. A study of the figures also shows that the cost of production will continue to be high so long as the average production of milk per cow is so low.

Feeding the same quantity of grain to cows bred for higher production would possibly double the quantity of milk produced and thereby increase the profits to the dairymen. The cattle tick has been eradicated from a large part of the section, and dairymen would find the milk business more profitable if they would keep better cows and feed them in accordance with their productive ability.

A study of the records also shows that dairymen could save grain by feeding more legume hay and succulent roughage. On many farms a larger quantity of manure could be saved, which when spread on the land would not only help to prevent the rains from gullying the soil, but would tend to produce larger crops.

MONTHLY DISTRIBUTION OF FACTORS IN MILK PRODUCTION.

How did the income from milk and the quantity sold and used each season compare with each other? How did the income and feed cost by seasons compare? These questions can be answered by referring to Table 10.

TABLE 10.—*Distribution, by months, of milk prices, milk sold and used, feed cost, and labor required.*

YEAR 1918–19.

Month and season.	Income per 100 pounds of milk.	Income from milk sold and used.	Milk sold and used.	Feed, pasture, and bedding cost.	Pasture and bedding cost minus manure and bedding credits.	Human labor.		Horse labor.	
						Per 100 pounds of milk.	Per cow.	Per 100 pounds of milk.	Per cow.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Hours.*	*Hours.*	*Hours.*	*Hours.*
October	$4.37	7.9	7.4	7.2	6.1	6.3	13.7	0.9	2.0
November	4.36	7.0	6.5	8.4	7.4	6.2	12.1	.8	1.5
December	4.30	6.0	5.7	9.0	8.0	7.4	13.3	1.1	2.0
January	4.63	6.8	5.9	11.7	10.7	6.6	12.5	1.0	1.9
February	4.60	6.3	5.6	10.6	9.5	6.2	10.8	1.0	1.7
March	3.98	9.1	9.2	8.5	7.4	5.3	14.9	.9	2.5
Winter	4.34	43.1	40.3	55.4	49.1	6.2	12.9	.9	1.9
April	4.07	9.1	9.0	7.2	6.2	5.3	14.7	.8	2.2
May	3.92	10.0	10.3	7.3	6.4	4.9	15.2	.6	1.9
June	3.88	9.6	10.0	7.0	6.1	4.8	14.3	.6	1.7
July	3.74	9.6	10.4	7.8	6.9	5.5	15.6	.6	1.7
August	3.83	10.1	10.8	7.8	6.8	5.0	14.8	.6	1.8
September	3.78	8.5	9.2	7.5	6.6	5.6	15.7	.7	2.0
Summer	3.87	56.9	59.7	44.6	39.0	5.2	15.1	.6	1.9
Year	4.06	100.0	100.0	100.0	88.2	5.7	14.0	.8	1.9

YEAR 1919–20.

October	5.07	7.8	6.8	6.8	5.9	5.5	12.6	0.9	2.0
November	5.21	7.3	6.2	7.7	6.8	5.9	12.7	.9	1.9
December	5.07	6.9	6.1	9.6	8.8	5.5	11.6	1.0	2.0
January	4.95	7.0	6.3	10.8	10.0	5.1	11.3	.7	1.7
February	4.81	7.0	6.5	9.3	8.5	4.8	11.4	.7	1.8
March	4.64	8.4	8.2	10.2	9.2	5.0	13.3	.7	2.0
Winter	4.94	44.4	40.1	54.4	49.1	5.3	12.2	.8	1.9
April	4.22	9.2	9.8	7.8	7.1	4.7	14.2	.7	2.1
May	4.13	10.2	11.0	7.6	6.8	4.4	14.8	.7	2.3
June	4.03	9.6	10.6	7.2	6.4	4.5	14.1	.6	2.0
July	4.17	10.0	10.7	7.7	7.0	4.7	15.9	.7	2.3
August	4.18	9.0	9.6	7.9	7.1	5.1	15.0	.8	2.3
September	4.13	7.6	8.2	7.4	6.7	5.1	13.8	.7	2.0
Summer	4.13	55.6	59.9	45.6	41.1	4.8	14.6	.7	2.2
Year	4.46	100.0	100.0	100.0	90.2	5.0	13.4	.8	2.0

During the first year, 56.9 per cent of the yearly income from milk, 59.7 per cent of the yearly quantity of milk, and 44.6 per cent of the yearly cost of feed, bedding, and pasture, came during the summer season. This shows a difference of 2.8 between percentage of the income from milk and the volume of milk. The difference between the income from milk and the feed, bedding, and pasture cost amounted to 12.3 per cent.

SUMMARY.

Feed, bedding, and pasture cost amounted to 53.4 per cent of the total cost of production. Labor made up 24.2 per cent; and other costs, including depreciation on herd, amounted to 22.4 per cent. (See Table 8.)

The requirements for producing 100 pounds of milk in winter were: Concentrates, 72.4 pounds; hauling and grinding grain, $0.095; dry roughage, 38.3 pounds; silage and other succulent roughage, 78.4 pounds; pasture, $0.155; bedding, 0.3 of a pound; human labor, 5.8 hours; horse labor, 0.9 of an hour; total other costs, $1.220. (See Table 1.) Credits for winter production other than milk: Manure, 127.7 pounds; calves, 0.033 of one calf. (See Tables 3 and 4.)

In summer the requirements were: Concentrates, 52.5 pounds; hauling and grinding grain, $0.050; dry roughage, 1.9 pounds; silage and other succulent roughage, 8.1 pounds; pasture, $0.197; human labor, 5 hours; horse labor, 0.7 of an hour; total other costs, $0.803. Credits other than milk: Manure, 78.2 pounds; calves, 0.023 of one calf.

To keep a cow one year it required: Concentrates, 1,893 pounds; hauling and grinding grain, $2.14; dry roughage, 538 pounds; silage and other succulent roughage, 1,171 pounds; bedding, 4 pounds; pasture, $5.58; human labor, 164.5 hours; horse labor, 23.7 hours; total other costs, $30.40. (See Table 2.) Credits other than milk: Calves, 0.8 of one calf; manure, 3,060 pounds.

To keep a bull one year requires: Grain, 1,202 pounds; hauling grain, $1.07; dry roughage, 779 pounds; silage and other succulent roughage, 1,126 pounds; bedding, 4 pounds; pasture, $4.66; human labor, 33.6 hours; total other costs, $23.40; credit for appreciation or increase in value of bulls, $20.89. (See Table 5.)

The dairy work was distributed as follows: Winter, men, 75 per cent; women, 16.2 per cent; boys and girls, 8.8 per cent; Summer, men, 70.9 per cent; women, 18 per cent; boys and girls, 11.1 per cent. (See Table 6.)

Interest, depreciation, taxes, insurance, and upkeep and repairs amounted to 22.1 per cent of the capital invested. (See Table 7.)

During each of the two winters the average income received from milk was 63 cents per 100 pounds below the average cost of production,

but during the first summer season the income received from milk was 96 cents above, and during the second summer 63 cents above the average cost of production. (See Table 9.)

Receipts for milk during the two winters were 43.1 per cent and 44.4 per cent of the receipts for the respective years. The net feed, pasture, and bedding cost was 49.1 per cent of the yearly net feed, pasture, and bedding cost for both the first and second winters. (See Table 10.)

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